REMARKS

The Office Action mailed July 14, 2004, has been carefully reviewed and the following remarks have been made in consequence thereof.

Claims 1-22 are pending in this application. Claims 1-6, 8, 12, 13, and 16-20 are rejected. Claims 7, 9-11, 14, 15, 21, and 22 are objected to.

The objection to Claims 1, 8, and 18 is respectfully traversed. Applicants respectfully submit that Claims 1 and 18 contain all essential method steps. Claim 1 recites a method of operating an imaging system having a main coil and a shield coil electromagnetically coupled to the main coil, the method including, "monitoring for an external environmental fluctuation of electromagnetism, and controlling current flow through the main and shield coils based upon said monitoring using a quench heater." Applicants submit that all essential method steps are contained in the foregoing claim, and invite the Examiner to set forth any missing essential subject matter.

Claim 18 recites a method of operating an imaging system comprising a main coil, a shield coil positioned to shield an electromagnetic field generated by the main coil, and at least one environmental fluctuation circuit operationally coupled to at least one of the main coil and the shield coil, the circuit comprising at least one detection coil, and a quench heater positioned proximate the detection coil, the method comprising, "energizing the quench heater such that the detection coil is in a non-superconductive state, supplying current to the main coil and the shield coil until a predetermined current is reached while the detection coil is in the non-superconductive state, activating a persistence switch to a superconductive state, and de-energizing the quench heater when the persistence switch is in the superconductive state." Applicants submit that all essential method steps are contained in the foregoing claim, and invite the Examiner to set forth any missing essential subject matter.

Applicants respectfully submit that Claim 8 contains all essential elements and their structural relationships. Claim 8 recites a magnet system comprising "at least one main coil, and at least one environmental fluctuation circuit operationally coupled to said at least one main coil, said circuit comprising, at least one detection coil, and a quench heater positioned proximate said detection coil." Applicants submit that all essential elements and their

structural relationships are contained in the foregoing claim, and invite the Examiner to set forth any missing essential subject matter.

Accordingly, for at least the reasons set forth above, Applicants respectfully request the objections to Claims 1, 8, and 18 be withdrawn.

The rejection of Claims 1-6 under 35 U.S.C. 102(b) as being anticipated by Gross et al. (5,731,939) is respectfully traversed.

Gross et al. describe a quench-protecting electrical circuit for protecting superconducting magnets. Coil portions 14 are in parallel with quench dump resistors 34, fan-in heaters 46, fan-out heaters 62, and switch wire 26. Gross, et al. describe protection of a superconducting magnet in Column 5, lines 20-46. In order to minimize potentially damaging temperatures and stresses that results from a local quench, Gross et al. describe that, when a quench starts in a local area of a coil, a voltage difference will occur in the coil portion. Fan-in resistor will heat up and quench the nearby switch wire. Voltage difference in the switch wire will set up a voltage difference in the series fan-out resistance heaters. The fan-out heaters heat up and evenly quench the entire coil section. Gross, et al. also describe a ramp-protection circuit (Column 5 lines 47-58 and Column 6 lines 29-35). Flux loops 80 and 82 are disposed outside the cryostat enclosure. During ramp-up of one of the coil portions 14, if an unbalance is detected in flux loops 80 and 82, a local quench then detected will trigger the previously discussed protective circuit. Notably, Gross, et al. do not describe a circuit that detects environmental fluctuation when an external disturbance is present.

Claim 1 recites a method of operating an imaging system having a main coil and a shield coil electromagnetically coupled to the main coil, the method comprising, "monitoring for an external environmental fluctuation of electromagnetism, and controlling current flow through the main and shield coils based upon said monitoring using a quench heater."

Gross et al. do not describe nor suggest a method as recited in Claim 1. Specifically, Gross, et al. do not describe nor suggest monitoring for an external environmental fluctuation of electromagnetism, and controlling current flow through the main and shield coils based upon said monitoring using a quench heater. Rather, Gross et al. describe a quench-protecting electrical circuit that, upon inception of a local quench, the entire coil is quenched evenly to minimize potentially damaging temperatures and stresses. As such, Gross et al. do not describe nor suggest monitoring for an external environmental fluctuation of

electromagnetism, and controlling current flow through the main and shield coils based upon said monitoring using a quench heater. Applicants respectfully traverse the assertion of the Examiner in the statement on Page 2 of the office action that, "Gross et al teach monitoring for an external environmental fluctuation of electromagnetism" and instead Applicants assert that the material cited by the Examiner as "figure 1, numeral 80 and 82; columns 5 and 11, lines 49-55 and 19-32" do not describe nor suggest monitoring for an external environmental fluctuation of electromagnetism. For at least the reasons above, Claim 1 is submitted to be patentable over Gross et al.

Claims 2-6 depend directly from independent Claim 1. When the recitations of Claim 2-6 are considered in combination with the recitations of Claim 21, Applicants submit that dependent Claims 2-6 likewise are patentable over Gross et al.

For at least the reasons set forth above, Applicants respectfully request that the 35 U.S.C. 102(b) rejection of Claims 1-6 be withdrawn.

The rejection of Claims 18-20 under 35 U.S.C. 102(b) as being anticipated by Gross et al. (5,731,939) is respectfully traversed.

Gross et al. is described above.

Claim 18 recites a method of operating an imaging system comprising a main coil, a shield coil positioned to shield an electromagnetic field generated by the main coil, and at least one environmental fluctuation circuit operationally coupled to at least one of the main coil and the shield coil, the circuit comprising at least one detection coil, and a quench heater positioned proximate the detection coil, the method comprising, "energizing the quench heater such that the detection coil is in a non-superconductive state, supplying current to the main coil and the shield coil until a predetermined current is reached while the detection coil is in the non-superconductive state, activating a persistence switch to a superconductive state, and de-energizing the quench heater when the persistence switch is in the superconductive state."

Gross et al. do not describe nor suggest a method as recited in Claim 18. Specifically, Gross, et al. do not describe nor suggest energizing the quench heater such that the detection coil is in a non-superconductive state, supplying current to the main coil and the shield coil until a predetermined current is reached while the detection coil is in the non-superconductive

state, activating a persistence switch to a superconductive state, and de-energizing the quench heater when the persistence switch is in the superconductive state. Rather, Gross et al. describe a quench-protecting electrical circuit that, upon inception of a local quench, the entire coil is quenched evenly to minimize potentially damaging temperatures and stresses. As such, Gross et al. do not describe nor suggest energizing the quench heater such that the detection coil is in a non-superconductive state, supplying current to the main coil and the shield coil until a predetermined current is reached while the detection coil is in the non-superconductive state, activating a persistence switch to a superconductive state, and de-energizing the quench heater when the persistence switch is in the superconductive state. For at least the reasons above, Claim 18 is submitted to be patentable over Gross et al.

Claims 19-20 depend directly from independent Claim 18. When the recitations of Claim 19-20 are considered in combination with the recitations of Claim 18, Applicants submit that dependent Claims 19-20 likewise are patentable over Gross et al.

For at least the reasons set forth above, Applicants respectfully request that the 35 U.S.C. 102(b) rejection of Claims 18-20 be withdrawn.

The rejection of Claim 8 under 35 U.S.C. 102(b) as being anticipated by Gross et al. (5,731,939) is respectfully traversed.

Gross et al. is described above.

Claim 8 recites a magnet system comprising "at least one main coil, and at least one environmental fluctuation circuit operationally coupled to said at least one main coil, said circuit comprising, at least one detection coil, and a quench heater positioned proximate said detection coil."

Gross et al. do not describe nor suggest a method as recited in Claim 8. Specifically, Gross, et al. do not describe nor suggest at least one main coil, and at least one environmental fluctuation circuit operationally coupled to said at least one main coil, said circuit comprising, at least one detection coil, and a quench heater positioned proximate said detection coil. Rather, Gross et al. describe a quench-protecting electrical circuit that, upon inception of a local quench, the entire coil is quenched evenly to minimize potentially damaging temperatures and stresses. As such, Gross et al. do not describe nor suggest at least one main coil, and at least one environmental fluctuation circuit operationally coupled to said

at least one main coil, said circuit comprising, at least one detection coil, and a quench heater positioned proximate said detection coil. For at least the reasons above, Claim 8 is submitted to be patentable over Gross et al.

For at least the reasons set forth above, Applicants respectfully request that the 35 U.S.C. 102(b) rejection of Claims 8 be withdrawn.

The rejection of Claims 12, 13, 16, and 17 under 35 U.S.C. 102(b) as being anticipated by Gross et al. (5,731,939) is respectfully traversed.

Independent Claim 8 has been addressed above. Claims 12, 13, 16, and 17 depend directly from independent Claim 8. When the recitations of Claim 12, 13, 16, and 17 are considered in combination with the recitations of Claim 8, Applicants submit that dependent Claims 12, 13, 16, and 17 likewise are patentable over Gross et al.

For at least the reasons set forth above, Applicants respectfully request that the 35 U.S.C. 102(b) rejection of Claims 12, 13, 16, and 17 be withdrawn.

Claim 7 was indicated as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 7 depends from independent Claim 1. As described above, Claim 1 has been amended to correct the errors cited in the Office Action. Accordingly, Applicants submit that Claim 7 is in condition for allowance.

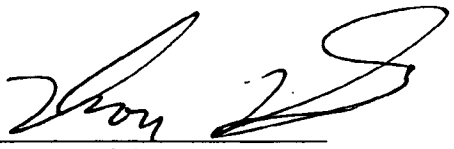
Claims 9-11, 14, and 15 were indicated as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 9-11, 14, and 15 depend from independent Claim 8. As described above, Claim 8 has been amended to correct the errors cited in the Office Action. Accordingly, Applicants submit that Claims 9-11, 14, and 15 are in condition for allowance.

Claims 21 and 22 were indicated as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 21 and 22 depend from independent Claim 18. As described above, Claim 18 has been amended to correct the errors cited in the Office Action. Accordingly, Applicants submit that Claims 21-22 are in condition for allowance.

The Examiner's note that Xu, et al (US 6,717,781) "Xu" "also reads on limitations of Claims 1, 8, and 18 to reject these claims under 35 U.S.C. 102(e)" is respectfully traversed. Xu describes a superconducting magnet electrical circuit that is provided for quench protection. The circuit results in protection of a superconductive magnet through a balanced quench (Column 2 lines 34-35). Main and secondary coils are connected each connected in series, and a plurality of quench heaters or quench resistors is provided. Symmetry or current balance in the overall circuit is preserved and, during a quench, the forces acting on each half of the structure will be minimized, resulting in a balanced quench, keeping interactive forces among the coils symmetrically balanced. Notably, Xu does not describe a method including externally monitoring for an environmental fluctuation of electromagnetism and controlling current flow through the main and shield coils based upon said monitoring using a quench heater (Claim 1). Xu also does not describe "at least one main coil, and at least one environmental fluctuation circuit operationally coupled to said at least one main coil, said circuit comprising, at least one detection coil, and a quench heater positioned proximate said detection coil (Claim 8)." Finally, Xu does not describe "energizing the quench heater such that the detection coil is in a non-superconductive state, supplying current to the main coil and the shield coil until a predetermined current is reached while the detection coil is in the non-superconductive state, activating a persistence switch to a superconductive state, and de-energizing the quench heater when the persistence switch is in the superconductive state" (Claim 18).

In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully Submitted,



Thomas M. Fisher
Registration No. 47,564
ARMSTRONG TEASDALE LLP
One Metropolitan Square, Suite 2600
St. Louis, Missouri 63102-2740
(314) 621-5070